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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,770	06/19/2006	Holger Schmitt	PHDE030127US	7743
38107	7590	11/23/2007		
PHILIPS INTELLECTUAL PROPERTY & STANDARDS 595 MINER ROAD CLEVELAND, OH 44143			EXAMINER BOR, HELENE CATHERINE	
			ART UNIT 3768	PAPER NUMBER
			MAIL DATE 11/23/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/553,770

Applicant(s)

SCHMITT ET AL.

Examiner

Helene Bor

Art Unit

3768

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 October 2005 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☒ Other: PCT Doc

### **DETAILED ACTION**

The examiner recognizes the amended claims 1-11. Thus under examination are the previously presented and amended claims, 1-12.

#### ***Response to Arguments***

1. Applicant's corrections filed 09/19/2007 regarding the claims objections are accepted. The claims objections are withdrawn.
2. Applicant's amendments with regards to the 35 USC § 112 are accepted and the rejection is withdrawn.
3. Applicant's arguments filed 09/19/2007 have been fully considered but they are not persuasive. The applicant argues that Koppe does not teach determining a concentration of the contrast agent based on X-ray absorption. The examiner respectfully disagrees. Koppe teaches X-ray projection images ...contain the information concerning the distribution of an inject contrast medium in the blood vessels at each time a different instant (Col. 1, Line 57-60). The distribution of an injected contrast medium is synonymous with the concentration of contrast agent. Koppe teaches assessing the concentration of contrast agent by the change in image values (Col. 2, Line 25-34). The relationship between image intensity affected by increases/decreases in the concentration agent and X-ray absorption is established in the art. Østergaard (excerpt included herein) further explains the relationship in Equation 3:  $C_i(t) = \kappa \cdot \Delta H$ ; where a change in image intensity is  $\Delta H$ , by the X-ray absorption of the contrast agent,  $\kappa$  is proportional to the concentration of a contrast agent  $C_i(t)$  (Page 13, Line 33 – Page 14, Line 4). Thus when Koppe teaches the

distribution of contrast agent by assessing the change in image values which has a known relationship to the X-ray absorption as described by Østergaard, Koppe is in fact teach determining a concentration of the contrast agent based on X-ray absorption. The examiner agrees that Koppe does not teach obtaining ECG information. However, Wink does teach obtaining ECG information with regards to the X-ray projections to obtain indicia of the phases of the periodic motion affecting the object (Col. 5, Line 3-5) to determine the optimal viewing of the coronary tree (Col. 5, Line 44-58). It would have been obvious to one of ordinary skill in the art to modify the system of Koppe to include the ECG device as taught by Winks in order to determine the optimal viewing of the coronary tree (Col. 5, Line 44-58). Thus the 35 USC § 103 rejection of claims 1-12 is maintained.

***Claim Rejections - 35 USC § 103***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claim 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koppe et al. (US Patent No. 6,442,235 B2) and further in view of Wink et al. (US Patent No. 7,180,976 B2).

**Claim 1, 7 & 8:** Koppe teaches an X-ray imaging device with computer means (Figure 1, Element 12, 13, 16 & 19 [Col. 4, Line 23-27]). Koppe teaches a device for visualizing the blood flow in a coronary vascular tree of a patient (Col. 1, Line 29-37 & Col. 4, Line 23-27). Koppe teaches the visualization (Figure 1, Element 18) is effected based on data which contain a first set of X-ray projection images of the vascular tree in

various phases of the heart cycle (Figure 1,  $D_1 \dots D_i \dots D_m$ ) and a second set of X-ray projection images (Figure 1,  $E_0 \dots E_i \dots E_n$ ) recorded during or after the administration of a contrast agent (Col. 6, Line 3-13). Koppe teaches computer means (Figure 1, Elements 15, 16 & 19) comprise a program control (Figure 1, Element 17), which operates in accordance with determining the time-dependent concentration [distribution] of contrast agent within the three-dimensional structure of the vascular tree (Col. 4, Line 35-37 & Claim 10). Koppe teaches reconstruction of the three-dimensional structure of the vascular tree during the various phases of the heart cycle using the first set of X-ray projection images and splitting of the structure into a number of vascular segments (Col. 4, Line 40-55). Koppe teaches determining the time-dependent concentration [distribution] of contrast agent within the reconstructed three-dimensional structure of the vascular tree (Col. 2, Line 50 – Col. 3, Line 11). Koppe teaches finding local image areas assigned to the individual vascular segments within the X-ray projection images of the second set corresponding to the spatial positions of the vascular segments (Claim 10). Koppe teaches determining the concentration of contrast agent within the vascular segments by evaluating the X-ray absorption within the local image areas (Col. 1, Line 56-60). Koppe teaches the visualization of the flow of contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent distribution of contrast agent (Claim 10 & Figure 1, Element 18). Koppe fails to teach the ECG gating of the X-ray imaging device. However, Wink teaches the assignment of the X-ray projection images of the second set to a respective phase of the heart cycle using the recorded second ECG (Col. 4, Line 16-23 & Col. 5, Line 3-6). It would have been

obvious to one of ordinary skill in the art to modify the system of Koppe to include the ECG device as taught by Winks in order to determine the optimal viewing of the coronary tree (Col. 5, Line 44-58) and in order to improve volumetric reconstruction (Col. 7, Line 3-13).

**Claim 2:** The claims are examined as best understood by the examiner. Koppe teaches an X-ray imaging, wherein the second set of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with contrast agent and then the first set of X-ray projection images is recorded after the vascular tree is completely filled with contrast agent (Col. 6, Line 3-13).

**Claim 3:** Koppe teaches an X-ray imaging device, with means for generating the first and the second set of X-ray projection images of the coronary vascular tree of the patient under various projection directions (Col. 1, Line 18-28). Koppe fails to teach the ECG gating of the X-ray imaging. However, Wink teaches the means for recording the ECG of the patient during the recording of the first and second sets of X-ray projection images (Col. 4, Line 16-23 & Col. 5, Line 3-6).

**Claim 4:** Koppe teaches an X-ray imaging device, wherein the computer means are arranged such that during or after the administration of the contrast agent first the second set of X-ray projection images is recorded while the vascular tree fills with contrast agent, and then the first set of X-ray projection images is recorded, after which the vascular tree completely fills with contrast agent (Col. 7, Line 11-19).

**Claim 5:** Koppe teaches an X-ray imaging device, wherein the computer means (Figure 1, Element 17) are further arranged such that the recording of the first and/or

second set of X-ray projection images is effected at a plurality of projection angles by means of continuous rotation-X-ray imaging (Col. 1, Line 18-28).

**Claim 6:** Koppe teaches an X-ray imaging device, wherein the computer means are arranged such that for reconstructing the three-dimensional structure of a computer-aided modeling of the vascular tree is effected while eliminating the other anatomical structures contained in the first set of X-ray projection images (Col. 6, Line 22-31).

**Claim 9:** Koppe teaches an X-ray imaging method, wherein the second set of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with contrast agent and then the first set of X-ray projection images is recorded after the vascular tree is completely filled with contrast agent (Col. 6, Line 3-13).

**Claim 10:** Koppe teaches an X-ray imaging method, wherein the recording of the first and/or second set of X-ray projection images is effected using continuous rotation-X-ray imaging at a plurality of projection angles (Col. 1, Line 18-28).

**Claim 11:** Koppe teaches an X-ray imaging method, wherein the recording of the second set of X-ray projection images is effected at least one fixed projection angle (Claim 11).

**Claim 12:** Koppe teaches an X-ray imaging method, wherein a computer-aided modeling of the vascular tree, with elimination of other anatomical structures contained in the first set of X-ray projection images (Col. 6, Line 22-31), is effected to reconstruct the three-dimensional structure (Col. 2, Line 38-40).

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helene Bor whose telephone number is 571-272-2947. The examiner can normally be reached on M-T 8:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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hcb

~~ERIC F. WALKER~~  
~~PRIMARY EXAMINER~~